![FieldServer Technologies logo]

Driver Manual
(Supplement to the FieldServer Instruction Manual)

FS-8707-06
FST OPC Server for FieldServers

APPLICABILITY & EFFECTIVITY

Effective for all systems manufactured after May 1, 2001

Driver Version:	**7.16**
Document Revision:	**7**

TABLE OF CONTENTS

1.   FST OPC Server for FieldServers Description

This OPC Server (I/O Driver) communicates with the FieldServer. The method of data transfer is called Data Array Access (DAA). The Data Arrays are arrays of typed data memory in the FieldServer. The source of the information in the Data Arrays can be any one of the standard FieldServer I/O Drivers.   It is incumbent on the user to configure the ports and the Map Descriptors on the FieldServer. The Map Descriptors are FieldServer objects containing polling instructions for an I/O Driver to copy data from the Low level Devices into a Data Array. One of the many advantages of this architecture is that it allows many disparate proprietary devices PLC/DCS's etc. to share common data in a reliable embedded device (FieldServer) while providing access to the SCADA/PC application level via this OPC Server. Please refer to the FieldServer Configuration Manual for instructions on configuration on the FieldServer side, the tools required are not part of this package.

Note for Users with a Client that uses the Syncio Interface: Please note that the Device mode is preferred over Cache mode when using this driver. The driver does support Cache mode, and this can be used if necessary.

1.1.   OPC Version Supported

The FST OPC Server supports OPC Version 2

2. Driver Scope of Supply

2.1. Supplied by FieldServer Technologies for this driver

FieldServer Technologies PART #	Description
FS-8915-10	UTP cable (7 foot) for Ethernet connection
FS-8707-06	Driver Manual

2.2. Provided by the Supplier of 3rd Party Equipment

2.2.1. Required 3rd Party Software

This OPC Server package must be installed on a Client supplied PC with the following requirements:

- Operating Systems: One of the Windows NT Family - Win NT 4SP4, Windows 2000 or Windows XP. The software does not run on any other version of windows.
- Machine requirements :
    - Pentium 200 MHZ
    - Memory – Minimum requirements of OS is sufficient, 64MB for Win2000 or 128MB for XP
    - Drive Space 2MB
- Other Required Software : Any OPC Client

3. Hardware Connections

The FST OPC Server communicates with the FieldServers via standard Ethernet & TCP/IP connections. Please refer to the FieldServer Configuration Manual for instructions on setting up the FieldServer side.

Before proceeding to configure the OPC Server we recommend that you have a proper TCP/IP network setup - verify this by PINGing a FieldServer. Refer to the Microsoft documentation for the setup of the TCP/IP networking on the PC.
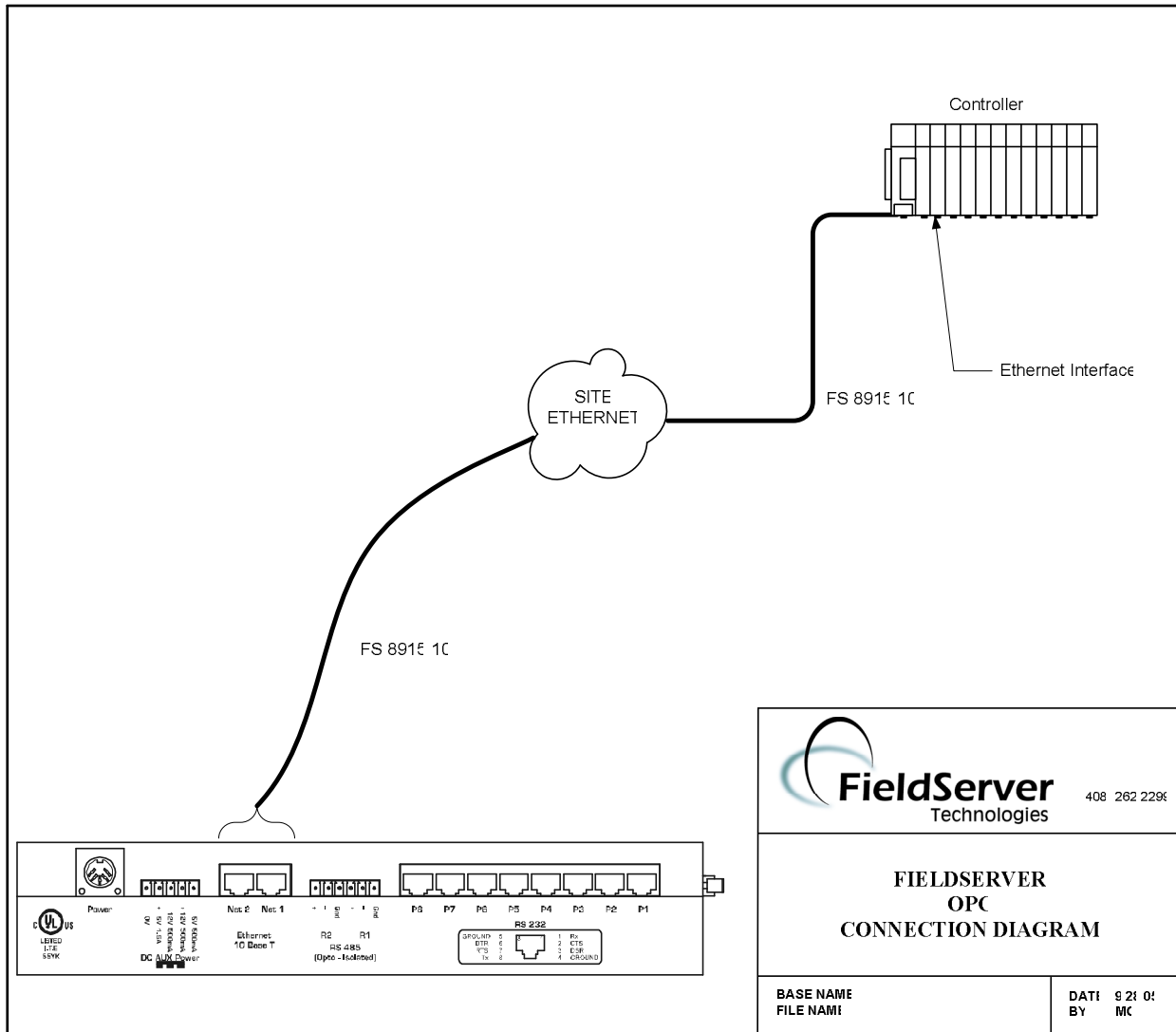
4. Installing the FST OPC Server for FieldServers

From the CD run the file **Setup.exe**
You will be guided through a series of dialogs prompting you for an Installation directory. When asked if you wish to install a Client or Server, "Server" is the default & recommended. Only Select Client If you wish to run the OPC Server on a different machine from the one where the OPC Client (usually a SCADA System) is running.

5.   Quick Start Steps to Implement a simple OPC configuration

1. Configure a FieldServer with a valid IP address. Make sure that at least one Data Array exists. An N1 or N2 connection must be configured with the SMT protocol (SMT is default so the protocol field can be blank). This Nx connection must be the one used to connect to the OPC Server machine.

2. Open a DOS box and "PING" the FieldServer from this machine to check that the networking is correctly setup. Take note of the IP address.

3. Configure Data Arrays in the FieldServer & note their names and data types (Read FieldServer Configuration Manual for more info)

4. Run the "FST Configurator" (This is in the Start menu program group you selected when you installed the OPC Server), and add an Ethernet connection to the config tree

5. Add a FieldServer to the config tree, edit the IP address & change the default name to something meaningful (note for future steps)

6. Add a Data Array to the config tree
   - Set the Name to that used inside the FieldServer. The name is not case sensitive and will be forced to uppercase.
   - The default "offset" is 0, and you will use this in 99% of cases.
   - Set the length to the number of elements in the FieldServer/Data Array or less. The maximum length is determined by the datatype of the Data Array. If you require more, make another poll block with offset > end of first block.
   - Set the data storage type to the data type of the Data Array in the FieldServer (this is important, as you may get incorrect values if set incorrectly)

7. Press the green "Start" button

8. Press the "Stats" button & check that we are sending & receiving, if not re-check the names of the Data Arrays, the IP address of the FieldServer. Keep your first configuration as simple as possible, one Data Array only.

9. You have now configured the OPC Server side; from here the user is expected to understand the operation of their specific OPC Client, the wording that follows is generic OPC terminology.

---

6. Configuring Your OPC Client to use the FST OPC Server for FieldServers OPC Server.

The OPC Client refers to the Application Using the data available in the FieldServer. Normally this is a SCADA system or other third party software.

From your Client browse the OPC Servers installed on the machine. Select the one named "FieldServer.7.16k". If you installed the Server on this machine then your Client should find this listed. If the FST OPC Server for FieldServers is on another machine then browse to that machine and select "FieldServer.7.16k". If it is not visible, check that the hidden application "OPCENUM.EXE" is running on the Server machine. If this fails please refer to the troubleshooting section

You have now successfully connected to the Server; next browse the Server. (If your Client does not have a browse facility, you will need to enter addresses manually see below). The Browse hierarchy has two levels - FieldServers & Data Arrays. Each entry under Data Arrays is a hint, pointing to the first element of the Data Array, The user needs to delete the hint text and edit the offset number on the end to enter the desired address.

I/O addresses are in the following format (Analog & Bit Datatypes)

<FieldServerName>:<Data Array name>:<offset>

Address format for packed bits in Integer types

<FieldServerName>:<Data Array name>:<offset>:<bit>

   * note for packed bits the OPC datatype MUST be VT_BOOL

6.1. OPC datatypes

This driver only has 2 canonical datatypes : VT_BOOL & VT_R4 (float). The default if no datatype is specified is VT_R4 (floating point). Many OPC Clients do not specify the datatype forcing the default.

7.   Quick Start Steps to Implement a Simple Intellution Fix Configuration

1. Configure a FieldServer with a valid IP address. Make sure that at least one Data Array exists. An N1 or N2 connection must be configured with the SMT protocol (SMT is default so the protocol field can be blank). This Nx connection must be the one used to connect to the OPC Server machine.

2. Open a DOS box and "PING" the FieldServer from this machine to check that the networking is correctly set up.

3. Configure Data Arrays in the FieldServer & note their names and data types (Read FieldServer Configuration Manual for more info)

4. Run the "FST Configurator" (This is in the Start menu prrogram group you selected when you installed the OPC Server), and add an Ethernet connection to the config tree

5. Add a FieldServer to the config tree, edit the IP address & change the default name to something meaningful (note for future steps)

6. Add a Data Array to the config tree
   - Set the Name to that used inside the FieldServer.   The name is not case sensitive and will be forced to uppercase.
   - The default "offset" is 0, and you will use this in 99 % of cases.
   - Set the length to the number of elements in the FieldServer/Data Array or less.   The maximum length is limited to 500. If you require more, make another poll block with offset 500
   - Set the data storage type to the data type of the Data Array in the FieldServer (this is important, as you may get incorrect values if set incorrectly)

7. Press the green "Start" button

8. Press the "Stats" button & check that we are sending & receiving, if not re-check the names of the Data Arrays, the IP address of the FieldServer. Keep your first configuration as simple as possible, one Data Array only.

9. Now go to the Options | Setup menu & set the default path to filename - <fix node name> & path = \FIX32\PDB or \Dynamics\PDB

10. Now Save the configuration to this location, It is not necessary to save every time you make a change. Fix simply requires this file to exist on disk.

11. In the Fix Database Builder add a new block (AI,AO,DI,DO,MDI) and set the I/O Device to "FST"

enter I/O addresses in the following format for AI & AR blocks & DI & DR & MDI blocks to bit datatype addresses.

<FieldServerName>:<Data Array name>:<offset>

enter I/O addresses in the following format for DI & DR & MDI blocks to packed bit addresses in Integer datatypes.

<FieldServerName>:<Data Array name>:<offset>:<bit>

8. Example Setup

8.1. Sample FieldServer Setup

In this example, the low level driver (Modbus) is irrelevant to the operation of the OPC Server, however the user needs to be aware of how field addresses map to Data Array addresses.

```
FieldServer
Title,
DAA_TEST

//   Server Side Connections
connections
adapter,                protocol
n1,                     SMT

Data_Arrays
Data_Array_Name,        Data_Format,        Data_Array_Length
SDA_BUA900_40001,       UInt16,             200

Nodes
Node_Name,              Node_ID,            Protocol,           Retries,    Port
BUA900,                 31,                 Modbus_RTU,         8,          R2

Map_Descriptors
Map_Descriptor_Name,    Data_Array_Name,    Data_Array_Offset,  Function,   Node_Name,  Address,    Length,   Scan_Interval
CMD_AI_BUA900_1,        SDA_AI_UINT16,      00,                 RDBC,       BUA900,     40001,      100,      5s
CMD_AI_BUA900_2,        SDA_AI_UINT16,      100,                RDBC,       BUA900,     40101,      100,      5s
```

8.2. Example OPC Server Setup
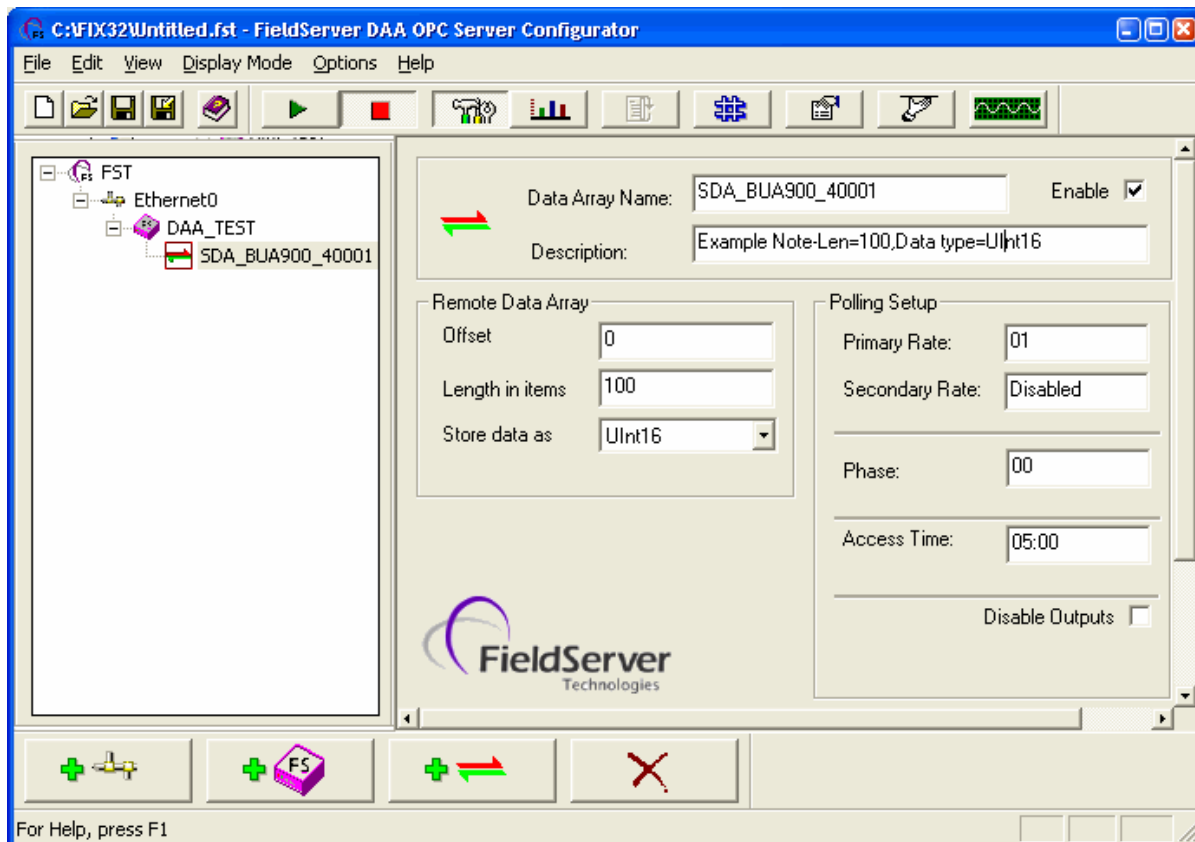
Appendix A. Troubleshooting

Appendix A.1.   FAQ

Q: **I cannot "see" the "FieldServer.7.16k" listed as an available data source?**

A: When Configuring an OPC Client link to the FieldServer OPC, your OPC Client will be browsing for available Servers using the OPC Foundation supplied utility OPCENUM.EXE (Installed with the FST OPC Server for FieldServers)

1. If the Client & Server are on the same machine
- Check that OPCENUM.EXE is running in the background, it is installed as a service & should start when the Client needs it
- If you are running NT4 or Windows 2000 AND you Installed Explorer 6.x AND you get the following message on installation "IcatInformation interface not supported" OR you see this message "Incompatible Version of RPC Stub 0x80070725" then our recommendation is that you uninstall IE6. This is a known issue that needs to be resolved by Microsoft & the OPC foundation. This problem does not appear to be an issue on Windows XP
- If you are still are not able to see the Server listed in your Client, your Client "should" allow you to manually type the ProgID. In some cases you may need to type the CLSID
    - ProgID   "FieldServer"
    - CLSID   {8D3DD5B6-8854-42a0-A376-94DE9676ADD5}

2. If the Client & Server are different machines
   In this case the same issues apply as above with the following additions
- Make sure that the networking is correctly setup, that you can see the Server machine in the network neighbourhood
- OPCENUM.EXE needs to run on both machines, on the Server machine it needs to be running at startup which sometimes does not happen – check the services & set the startup mode of the OPCENUM service.

Q: **My OPC Client is just giving me OPC data quality bad - Why ?**

A: The first place to look is in the Configurator - select the Data Array containing the address you are looking at. Then press the "Stats" button

The following are some of the Symptoms to lookout for:
- If the Timeout & retry counters are incrementing then the problem is with the communication to the FieldServer.
    - Make sure that you can "Ping" the FS.
    - Make sure that the Ethernet port on the FS is configured for SMT protocol
- To the Right of the "Last Error Field" there is a Text field that is "--" normally
    - If it Says "Bad DA name" it means this Data Array does not exist in the FS check your FS configuration
    - If it Says "Bad DA offset" it means that you are attempting to poll more data than exists in this DA – shorten the length

Appendix A.2.   The OPC Server – Limitations- Q&A

Q: How many fieldServers can one OPC Server communicate with?
A: Unlimited

Q: How many Clients can connect to the Server and how many points are possible?
A: Unlimited Clients & points, memory usage is about 2k/point/Client e.g.20 Clients with 10000 tags ea = 400MB. Server creates a thread for each Client, default each Client is looping thru 10000 tags every 25 ms looking for change of state. Such a config will probably flatten a 2G P4.

Q: Speed limitations?
A: The FS is the bottleneck at ~ 50 poll blocks/sec (to test set poll rate to 0)
e.g.. 2 FS total poll rate is ~100/s, if you have 10000 digitals in one DA on each FS
that's 2*50*10000 = 1 000 000 digitals per second.

Q: Remote Clients possible? Limits?
A: Yes I am running The Server & MB8PC under the debugger on my laptop, & Graphworx on another PC.
This is not recommended for complexity / reliability reasons.
Since the FieldServers are networked, rather run the Server on the Client machine - why bring a third layer in unnecessarily?.
When running remotely you should be able to OPC browse onto the Server machine, if this fails make sure that the OPCENUM service starts & runs on Server.
When running remotely the OPC Server is running under the app "dllhost.exe" in taskman. Because most Clients use OPC in asynchronous mode, the performance is almost indistinguishable for medium amounts of data.

Q: Is this an inprocess or out of process Server?
A: COM has 3 modes:- inprocess, local & remote
Local & remote have similar performance - the overhead of each COM call is 1000's of times slower compared to inprocess.
Since this driver is capable of **inprocess** that should be used if option in your Client.

THIS PAGE INTENTIONALLY LEFT BLANK